and 8; Claim 11 at page 8, first full paragraph; Claims 12 and 13 at page 8, second full paragraph; Claim 14 at page 8, third full paragraph; Claim 15 at page 9, third paragraph; Claims 16 and 17 at the paragraph bridging pages 11 and 12; Claim 18 at page 12, last full paragraph; and Claim 19 at page 1, first paragraph.

No new matter has been added by the above amendment. Claims 1-3 and 5-19 are now pending in the application.

REMARKS

The rejection of Claims 1-5 under 35 U.S.C. § 103(a) as unpatentable over U.S. 5,197,242 (Baughman et al) in view of U.S. 6,113,811 (Kausch et al), is respectfully traversed.

The present invention relates to a polyvinyl alcohol film having uniform optical characteristics over a relatively large area, and having a relatively large width, the polyvinyl alcohol film being suitable for use as a polarization film in a liquid crystal display (LCD) having a large screen.

As described in the specification under "Description of the Prior Art" beginning at page 1, second paragraph, polyvinyl alcohol-based polymers (PVA) films have been used in making polarizers for LCDs. Prior art methods of forming such films have included casting on a belt or drum in which a film material in the form of a solution or melted substance is fed onto a heated belt or drum, and dried to form a film. However, it has been difficult to obtain a film having a uniform thickness, and thickness irregularities have been of two types, one is a (1) large waviness containing unevenness in thickness over an area of length within several cm to some 10 cm along the TD direction, and (2) local streaks caused by thickness irregularities occurring on a film over an area of a length within 1 mm.

The present invention is concerned with type (2) irregularities, i.e., wherein linear streaks (unevenness) may occur continuously along the MD direction (longitudinal direction) from a discharging portion or lip of a die with the lapse of time in discharging a film material from the die. Although this streak was not conventionally recognized as a problem, this problem has been discovered with the recent increase in screen size and increase in screen luminance of LCDs, when a PVA film has streaks, a polarization film produced from this film shows color irregularity, leading to an optical defect. No successful technology directed to solving this local streak defect has been known to date. Also, with the recent increase in screen size of LCDs, optical films having a width of at least 2 m are required. However, it is necessary to connect belts along the MD direction when using the method of casting on a belt to produce films having such minimum width. As a consequence, when a PVA film material is discharged onto a belt and dried, the product cannot be used as an optical film in some cases, due to various optical insufficiencies caused by local streaks on the connecting portion of the belts.

The present invention is directed to solving the above problems. As recited in Claim 1 as amended above, the invention is a polyvinyl alcohol film wherein the film is obtained by casting on drum, and the variance in thickness along the transverse direction of the film is 0.5 μm/mm or less, the thickness of the film is within the range of 20 to 150 μm, and the width of the film is at least 2 m.

The specification contains comparative data showing the importance of various, not previously known, result-effective variables on the qualities of the polyvinyl alcohol film. Examples 1-4 are according to the present invention. Comparative Examples 1-4 are for purposes of comparison. The films produced were measured for variance in thickness per unit mm along the TD direction, as described in the specification at page 13, lines 3-8. The

data is shown in Table 1 at page 19 of the specification, a copy of which is **attached herewith**. Comparative Example 1 used a cationic surfactant instead of a non-ionic surfactant. Comparative Example 2 employed a film having a different volatile component factor and a different die method. Comparative Example 3 employed a belt rather than a drum. Comparative Example 4 employed a different stretching ratio. Table 1 shows that all of these changes were result-effective, not appreciated by the applied prior art.

In the Office Action at page 3, lines 7-9, the Examiner states: "With regards to the limitation that the film has a thickness [sic, width] of 2m or more, the Examiner takes the position that for a 2m or larger window the polarizer must inherently be 2m or larger." However, a film 2m or larger in width is not the same as one with that width having a uniform thickness. This is proved by the fact that there was no film with a width of 2m or larger in the prior art. The reason for non-existence of such a wide film is that no productive method existed prior to the present invention. As described in the subject specification at page 2, lines 6-20, and as described above, there are two methods of producing a PVA film. One involves casting on a belt; the other involves casting on a drum.

In the first method, since no belt with a width of 2m or larger is industrially available, two or more belt pieces would be connected in parallel, as described in the specification at page 3, lines 10-17, and as a consequence, the PVA film produced bears streaks at a portion corresponding to connecting portions of the belt pieces. On the other hand, in the second method, when a film material is discharged from a die onto the drum, local streaks (unevenness) occur continuously along the MD direction with the lapse of time due to successive dry-out of the material on the drum. Such streaks cause color irregularities of the film.

As discussed above, according to the prior art methods no PVA film with a width of 2m or larger and with sufficiently uniform thickness was produced to meet the demand for increase in screen size of LCD.

Now it is clear that the present invention finds its technological significance in providing a PVA film with uniform optical characteristic over a large area or large width, which film is suitable for use of a polarization film in a large LCD.

Baughman et al disclose a dual pane thermal window with liquid crystal shade having polarizer sheets therein. It appears that the Examiner is simply relying on Baughman et al for a disclosure that polarizer sheets are known. Applicants do not dispute this fact.

Kausch et al disclose a dichroic polarizing film made by combining polyvinyl alcohol and a second polymer. The presence of the second polymer is intended to be an improvement over polyvinyl alcohol films without such a second polymer, which tend to crack under stretching conditions (column 3, line 49 ff). Kausch et al disclose further that the films of their invention may be made in a variety of ways, such as by applying a dispersion/solution of the two polymers to the surface of a substrate by shoe coating, extrusion coating, roll coating, curtain coating, or any other coating method capable of providing a uniform coating, and that typically, the thickness of the coating is 25 to 500 μm when wet (column 4, lines 21-38).

The Examiner presumes that the polyvinyl alcohol - second polymer film of Kausch et al meets the terms of the present claims because the term "uniform coating" is used therein. In reply, Kausch et al disclose no standards by which the term "uniform coating" would be understood and it is clear in this art that films having a surface with **no** variation in thickness, especially over the relatively large widths herein, are essentially non-existent. That Kausch et al do not distinguish among the various known methods of forming such films suggest that Kausch et al was not even aware of the above-discussed local streak-type irregularity. Nor

does Kausch et al disclose or suggest anything with regard to the thickness uniformity of PVA films not containing the second polymer therein. Finally, Kausch et al clearly do not recognize the importance of the various result-effective variables discussed above with regard to the presently-claimed invention. Thus, even if one skilled in the art replaced the polarizer disclosed by Baughman et al with the polarizing film disclosed by Kausch et al, the result would still not be the presently-claimed invention.

For all the above reasons, it is respectfully requested that the rejection over Baughman et al in view of Kausch et al be withdrawn.

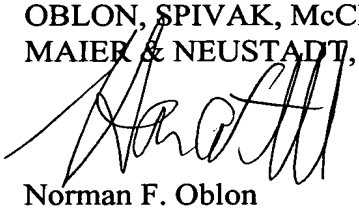
The objection to Claim 1 is now moot in view of the above-discussed amendment. Accordingly, it is respectfully requested that it be withdrawn.

All of the presently pending claims in this application are now believed to be in

immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.



Norman F. Oblon
Attorney of Record
Registration No. 24,618

Harris A. Pitlick
Registration No. 38,779

22850

(703) 413-3000
Fax #: (703)413-2220
NFO:HAP:cja
I:\atty\HAP\208300US-am.wpd

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IN THE CLAIMS

--1. (Amended) A polyvinyl alcohol film wherein the film is obtained by casting on drum, and the variance in thickness along the [TD] transverse direction of the film is 0.5 μm/mm or less, the thickness of the film is within the range of 20 to 150 μm, and the width of the film is at least 2 m.

2. (Amended) The polyvinyl alcohol film according to claim 1, wherein the variance in thickness along the [TD] transverse direction of the film is a 0.28 μm/mm or less.

4. (Cancelled).

5. (Amended) A polarization film produced from the polyvinyl alcohol film [for a polarization film of Claim 4] of claim 1.

6-19. (New).--

	Film material		Film formation method	Drum diameter (m)	PVA film			Quality of polarizer	Remarks
Example 1	Degree of polymerization of PVA	Volatile component factor (% by weight)	Drum	3.2	Average thickness (μm)	Width (m)	Maximum value of variance in thickness (μm/mm)	Optical streak irregularity	
Example 2	2400	63	Drum	3.2	74	3.4	0.15	Excellent	
Example 3	4000	72	Drum	2.5	76	3.2	0.1	Excellent	
Example 4	5500	78	Drum	3.2	72	2.5	0.3	Excellent	
Comparative Example 1	1700	60	Drum	3.2	75	3.2	0.2	Excellent	Cationic surfactant was added.
Comparative Example 2	2400	63	Drum	3.2	75	3.4	0.9	Poor	Streaks were generated along the TD direction, and when a polarizer was made, optical streaks accompanying
Comparative Example 3	2400	84	Belt	-	75	3.3	0.7	Poor	A joint at the center part of a belt was transferred to a film, and optical streaks were generated.
Comparative Example 4	2400	63	Drum	3.2	74	2.4	0.5	Poor	Stretching irregularity occurred.